Citation:

Augustin LS, Galeone C, Dal Maso L, Pelucchi C, Ramazzotti V, Jenkins DJ, Montella M, Talamini R, Negri E, Franceschi S, La Vecchia C. Glycemic index, glycemic load and risk of prostate cancer. *Int J Cancer*. 2004 Nov 10;112(3):446-50.

PubMed ID: 15382070

Study Design:

Case-Control Study

Class:

C - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To investigate the association of dietary glycemic index and glycemic load with prostate cancer risk in a case-control study conducted in Italy.

Inclusion Criteria:

- Men aged 46 - 74 years
- Cases were men admitted for incident, histologically confirmed prostate cancer
- Controls were men admitted for acute, non-malignant conditions unrelated to long-term modifications of diet
- Admitted to the major teaching and general hospitals in the greater Milan area, the provinces of Pordenone and Gorizia in northern Italy, the province of Latina in central Italy and the urban area of Naples in southern Italy

Exclusion Criteria:

Excluded from the analysis were 90 cases and 99 controls with diabetes.

Description of Study Protocol:

Recruitment

Cases and controls were recruited between 1991 and 2002 in the network of major teaching and general hospitals in 4 Italian areas.

Design Case-Control Study

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- Odds ratios of prostate cancer and the corresponding 95% confidence intervals were derived using unconditional multiple logistic regression

Data Collection Summary:

Timing of Measurements

- The same questionnaire was used in all study centers and it was satisfactorily reproducible and valid.
- The questionnaire was administered by centrally trained interviewers during the subjects' hospital stay and included information on sociodemographic characteristics and lifestyle habits, occupational and leisure-time physical activity at various ages, problem-oriented medical history, history of cancer in first-degree relatives and anthropometric measures

Dependent Variables

- Prostate cancer diagnosis

Independent Variables

- Dietary glycemic index and glycemic load
- Interviewer-administered 78-item food frequency questionnaire was utilized to assess the usual diet for the 2 years preceding diagnosis for cases or hospital admission for controls
- Average daily glycemic index and average glycemic load of a subject's diet were computed

Control Variables

- Age
- Study center
- Education
- Family history of prostate cancer
- Smoking
- BMI
- Physical activity
- Alcohol consumption
- Intake of energy, fiber and lycopenes

Description of Actual Data Sample:

Initial N: 1,204 male cases, 1,352 male controls

Attrition (final N): as above

Age: median age cases = 66 years, controls = 63 years

Ethnicity: not mentioned

Other relevant demographics:

Anthropometrics

Location: Italy

Summary of Results:

OR and 95% CI of Prostate Cancer According to Glycemic Index and Glycemic Load

Variables	Q1	Q2	Q3	Q4	Q5	X^2 trend	Continuous OR (95% CI)
Glycemic Index							
Lower cut-off	---	72.01	75.21	77.98	80.92	---	---
Cases/controls	216/296	235/277	250/262	258/251	245/266	---	---
OR (95% CI)[2]	1 (reference)	1.27 (0.98 - 1.65)	1.39 (1.07 - 1.79)	1.59 (1.23 - 2.06)	1.46 (1.12 - 1.89)	10.83, P < 0.01	1.28 (1.12 - 1.46)
OR (95% CI)[4]	1 (reference)	1.23 (0.95 - 1.60)	1.24 (0.96 - 1.61)	1.47 (1.12 - 1.91)	1.57 (1.19 - 2.07)	11.62, P < 0.01	1.28 (1.11 - 1.47)
Glycemic Load							
Lower cut-off	---	168.04	203.32	240.95	291.14	---	---
Cases/controls	210/301	237/274	2377/274	266/245	254/258	---	---
OR (95% CI)[2]	1 (reference)	1.26 (0.97 - 1.63)	1.36 (1.05 - 1.76)	1.80 (1.39 - 2.33)	1.65 (1.27 - 2.14)	20.45, P < 0.01	1.32 (1.16 - 1.49)
OR (95% CI)[4]	1 (reference)	0.91 (0.69 - 1.18)	1.00 (0.75 - 1.31)	1.20 (0.90 - 1.59)	1.41 (1.04 - 1.89)	7.86, P < 0.01	1.22 (1.05 - 1.41)

[2]ORs were adjusted for quinquennia of age, study center, education and family history of prostate cancer

[4]ORs were adjusted for quiinquennia of age, study center, education, family history of prostate cancer, energy intake, alcohol consumption, smoking habit, BMI, occupational physical activity at 50 years, intake of fiber and intake of lycopene

Other Findings

Cases reported more frequently than controls a high level of education (20.4% vs 13.5%), a low level of physical activity at 50 years of age (37.9% vs 29.9%) and a family history of prostate cancer (7.1% vs 2.0%), whereas similar frequency distributions were observed for BMI, alcohol consumption and intake of lycopene.

Compared to the lowest quintile of glycemic index, the odds ratios were 1.23, 1.24, 1.47 and 1.57 for subsequent levels of glycemic index.

The corresponding values for glycemic load were 0.91, 1.00, 1.20 and 1.41.

There were significant positive trends for both glycemic index and glycemic load ($P < 0.01$).

No heterogeneity was found among strata of selected covariates.

Author Conclusion:

We found direct relations between dietary glycemic index and glycemic load and prostate cancer risk. Correcting for potential confounding factors did not substantially modify these associations.

Reviewer Comments:

Large numbers of cases and controls. Cases and controls differed at baseline in terms of age (median, not mean reported), education, physical activity, and family history of prostate cancer, quinquennia were controlled for in the analysis. Data based on self-report. Authors note the following limitations:

- *Information was collected after diagnosis, thus it is possible that the early symptoms of the disease may have caused changes in the diet*
- *Glycemic index and glycemic load values may have some variability according to specific foods and cooking methods*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes

2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	Yes
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	N/A
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	N/A
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes

5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	Yes
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	N/A
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	No
7.1.	Were primary and secondary endpoints described and relevant to the question?	N/A
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	N/A
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	No
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes

	7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**		Yes
	8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
	8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
	8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
	8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
	8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
	8.6.	Was clinical significance as well as statistical significance reported?	Yes
	8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**		Yes
	9.1.	Is there a discussion of findings?	Yes
	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes